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The Honorable Spencer Abraham  
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October 18, 2001

*4 pages*  
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OCT 19 2001

*The Law of Concentrated Benefit over Diffuse Injury:*

*A small, determined group, working energetically for its own narrow interests,  
 can almost always impose an injustice upon a vastly larger group,  
 provided that the larger group believes that the injury is "hypothetical,"  
 or distant-in-the-future, or real-but-small  
 relative to the real-and-large cost of preventing it.*

RE: Possible Site Recommendation for Yucca Mountain

Dear Secretary Abraham:

**IONIZING RADIATION AND PUBLIC HEALTH**

Chronic illness afflicts nearly half of all Americans and causes three out of four deaths in the United States<sup>1</sup>. These diseases were extremely rare only a generation or two ago. Formerly the ailments of the very old - these diseases now occur in children and those in the prime of life. Studies on the health of indigenous people reveal that they used to have almost no cancer or tooth decay, and lived in a general state of excellent health<sup>2</sup>. Our natural state is one of balance, wholeness, and vitality - looking good, fully functioning and alert - with disease free childhoods.

Today, in Western countries one in three will get cancer<sup>1</sup> (the National Cancer Institute reports 40% in the U.S.) and nearly half suffer from heart disease<sup>1</sup>. The World Health Organization (WHO) estimates that over the next 25 years, cancers will double in most countries<sup>6</sup>. Degenerative diseases (arthritis, multiple sclerosis, high blood cholesterol conditions, digestive disorders, tooth decay, diabetes, osteoporosis, Alzheimer's, epilepsy and Chronic Fatigue Syndrome), immune system diseases (septicemia, pneumonia, AIDS, Lyme's disease, Lupus, meningitis), and brain function disorders have increased alarmingly<sup>1,4,5,6</sup>. Mothers cope with children who suffer increasingly from low birth weights<sup>9</sup>, frequent infections, allergies, anaemia, juvenile diabetes, asthma, poor vision, lack of co-ordination, fatigue, autism, and learning and behavioral problems such as Attention Deficit Disorder (ADD). Hypothyroid disease in newborns (from exposure to radioactive iodine), which is associated later with many learning problems, has increased 47.6% from 1981-1994<sup>7</sup>. A healthy disease free childhood is normal and should be expected by today's parents, but that is not what is happening.

Clearly, something environmental is causing this worldwide increase in deaths and diseases for all ages and all races<sup>3,4,6,7,9,10,19</sup>. There is no doubt that environmental radiation is a much larger factor in the degradation of public health globally since 1945 (when the first fission products were released by nuclear bombs) than has been officially recognized or admitted to by bureaucratic governments informed by scientific power. During the Cold War governments were mainly concerned with the need to maintain a credible nuclear deterrent and covered up the health dangers of radiation<sup>3,6,7,9,10,12,18</sup>.

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A civilian 1000-megawatt nuclear reactor produces as many long-lived radioactive atoms, each operating year, as the explosions of about 1,000 Hiroshima-sized nuclear bombs<sup>7</sup>. There are 104 operating nuclear power plants in the U.S., followed by France with 59<sup>8,9</sup>. Cancer and immune-deficiency are political diseases largely caused by the proliferation of nuclear weapons and nuclear power<sup>3,4,6,7,9</sup>. The by-product of these industries is nuclear waste which has contaminated the air we breathe, the water we drink, and the soil where we grow our food.

**In the years ahead the continuing operation of nuclear power plants and the decommissioning of Department of Energy installations, military bases, nuclear power plants, and nuclear fuel reprocessing plants - that extract plutonium from spent fuel, will be the greatest threat to our health in the 21<sup>st</sup> century.**

### GENOME INSTABILITY

In 1914, Theodor Boveri, a great German embryologist predicted that malignancy is the result of inappropriate genetic information in tumor cells<sup>12</sup>. The recent interest in genome instability<sup>12,14,15</sup> and the link to radiation and cancer is slow recognition of Boveri's prediction<sup>12</sup>. A new understanding has emerged, that cancer is a process or a trip (or set of trips) from the stable genome to a genome with diverse deviations<sup>12</sup>. One of the hallmarks of the cancer cell is the known instability of its genome.

Ionizing radiation is a mutagen capable of causing all known types of genetic mutation – from micro to gross, at any DNA location along any chromosome – and makes it an obvious cause of genome instability<sup>12</sup>. The different energies of alpha particles, beta particles, gamma and X-rays, neutrons etc. and their energy dispersion (linear energy transfer or LET) as they pass through a cell produce different kinds of damage<sup>6,7,10,14,15,16</sup>. Imbalance can result from missing or excess numbers of chromosome aberrations or structural alterations within the 46 chromosomes. Ionizing radiation is a leading cause of structural chromosome damage such as deletions, acentric fragments, translocations, inversions, dicentrics etc.

In addition, the formation of free radicals, reactive oxygen species (superoxides etc.) reactive nitrogen species and low-energy electrons (activation products) as secondary events produce even more damage as the energy is transferred by molecular excitation from the primary event<sup>11,13,14,16</sup>. Secondary damage from activation products causes 75% of the damage – and is therefore much more extensive. Chronic exposure to low level radiation has a cumulative effect and can be somatic (unlikely to be passed on), genetic (passed on), epigenetic, teratogenic etc. Chronic exposure continually increases the probability of cancer as well as disruption of normal cell processes and signaling that are necessary for cell function.

A single submicroscopic radioactive particle can cause a fatal disease. Health physicists and the nuclear industry use "waring blender" biology and physiology, "bathtub" chemistry, and "steam engine" units of energy (joules/kg or ergs/gm = energy density) to deceptively average radiation exposure over a whole body. This does not take into consideration the damage to the living dynamic system of life which is a cooperative network. In fact, radiation acts like mini-nukes passing through cells "like bulls in a china shop", as highly energized<sup>16</sup> submicroscopic particles tear through the complex of membranes, gates, pumps, pipes, tubes, transporters, motors, DNA and signaling mechanisms in a cell. A 0.1 micron particle (millions of atoms) of plutonium

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oxide (PuO<sub>2</sub>) disintegrates approximately 760 times in a year – 2-3 per day<sup>16</sup>. That number of disintegrations releases radiation locally at a rate of hundreds of rads (thousands of rems) per year. The standard allowable exposure is ten rads per year. And that is from one microscopic particle which is about one thousandth the diameter of a human hair (70-100microns).

Ionizing radiation was first shown to be a mutagen more than 65 years ago by H J. Muller who experimented on *Drosophila* (Genus fruit flies)<sup>17</sup>. Using X-rays he was able to induce visible mutations in fruit flies. For every visible expression of a genetic mutation, he predicted that there were “many more” mutations not visible or yet expressed<sup>17</sup>. The increase in cancer and disease globally in the past half century is an indicator of damage already done by ionizing radiation exposure. But, like the invisible mutations in fruit flies - that are not expressed for generations, the full extent of that damage to humanity will not be known for generations. What can be predicted is:

- Genomic instability will probably keep cancer and radiation related diseases hard to cure.
- The quickest path to less suffering from radiation related diseases in the future would be a policy of reducing exposure to radiation – even at low levels – and other carcinogens.
- Ionizing radiation is almost certainly the most potent carcinogen to which vast numbers of people are actually exposed.

Rosalie Bertell, in her article “Victims of the Nuclear Age”<sup>19</sup>, estimates that 1.2 billion people have been killed, maimed or diseased by nuclear power in the past half century.

**THE YUCCA MOUNTAIN PROJECT WILL RESULT IN THE ADDITIONAL EXPOSURE TO IONIZING RADIATION OF MILLIONS MORE DUE TO:**

- **SCIENCE FRAUD THROUGHOUT THE PLANNING AND DEVELOPMENT OF THE FACILITY – THE MOST IMPORTANT PUBLIC WORKS PROJECT IN U.S. HISTORY - WHICH WILL FAIL**
- **TRANSPORTATION THROUGH THE CITIES AND COMMUNITIES OF THE UNITED STATES – which will expose millions of bystanders**
- **CONTAMINATION OF NEVADA AND SURROUNDING STATES BY THE LEAKING AND MIGRATION OF RADIONUCLIDES FROM THE FACILITY – in addition to the contamination already there**
- **IMPACT ON DEMOCRACY<sup>18</sup> BY EXPOSURE OF UNBORN GENERATIONS WITHOUT THEIR CONSENT OR INFORMING THEM**

The real cost of the Yucca Mountain Project has not been considered in terms of the cost in lives and impact on public health -- for many generations. That is the most important consideration.

Sincerely yours,

  
Lauren Moret

President, Scientists for Indigenous People  
City of Berkeley Community Environmental Advisory Commissioner

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Cc: U.S. Senate, U.S. House of Representatives, U.S. Nuclear Waste Technical Review Board, Governor Quinn NV, Berkeley City Council, Public Citizen, Citizen Alert, Nevada Nuclear Waste Task Force, Shundahai, Radiation & Public Health Project, Laka Found., CNIC-Jp, E. Sternglass, J. Gould, R. Bertell, J. Gofman, A. Bates, C. Busby

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